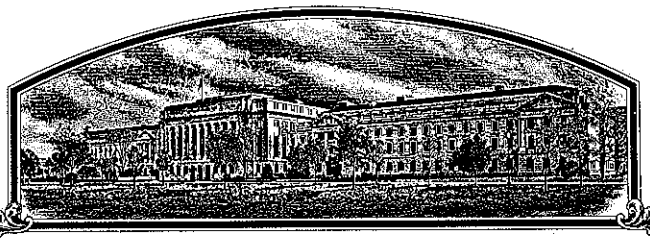
No. 8900139



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Wisconsin Agricultural Experiment Station

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED NOVEL VARIETY OF SEXUALLY REPRODUCED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF *eighteen* YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. THE UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS REQUIRED BY THE OWNER OF THE RIGHTS. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

BARLEY

'Chopper'

In Testimony Whereof, *I have hereunto set my hand and caused the seal of the* Plant Variety Protection Office *to be affixed at the City of* Washington, D.C. *this* 30th *day of* April *in the year of our Lord one thousand nine hundred and* ninety-three.

Attest:

Kenneth B. Evans

Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Secretary of Agriculture

APPROVAL EXPIRES 2-28-88

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions on reverse)

FORM APPROVED: OMB NO. 0581-0055

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

Robert Fosberg AAA 29 June 1993

1. NAME OF APPLICANT(S): Wisconsin Agricultural Experiment Station, ~~M.A. Brinkman~~, authorized

2. TEMPORARY DESIGNATION: Wis. sel X2860-3

3. VARIETY NAME: Chopper

4. ADDRESS *(Street and No. or R.F.D. No., City, State, and Zip Code)*: Agriculture Hall, University of Wisconsin-Madison, Madison, WI 53706

5. PHONE *(Include area code)*: 608-262-4930

FOR OFFICIAL USE ONLY

PVPO NUMBER: 8900139

6. GENUS AND SPECIES NAME: Hordeum vulgare L.

7. FAMILY NAME *(Botanical)*: Gramineae

FILING
DATE: April 3, 1989
TIME: 9:30 [X] A.M. [ ] P.M.

8. KIND NAME: Barley (2-rowed)

9. DATE OF DETERMINATION: February 22, 1988

FEES RECEIVED
AMOUNT FOR FILING: $ 1800.00
DATE: April 3, 1989
AMOUNT FOR CERTIFICATE: $ 200.00
DATE: April 19, 1993

10. IF THE APPLICANT NAMED IS NOT A "PERSON," GIVE FORM OF ORGANIZATION *(Corporation, partnership, association, etc.)*: Wisconsin Agricultural Experiment Station

11. IF INCORPORATED, GIVE STATE OF INCORPORATION

12. DATE OF INCORPORATION

13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS

~~Marshall A. Brinkman~~, Department of Agronomy
University of Wisconsin-Madison
Madison, WI 53706

Robert Fosberg AAA 10 Dec 1992
10 Dec 1992

PHONE *(Include area code)*: 608-262-~~9571~~ 0246 per phone call to GK

14. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED

a. [X] Exhibit A, Origin and Breeding History of the Variety *(See Section 52 of the Plant Variety Protection Act.)*
b. [X] Exhibit B, Novelty Statement.
c. [X] Exhibit C, Objective Description of Variety *(Request form from Plant Variety Protection Office.)*
d. [X] Exhibit D, Additional Description of Variety.
e. [X] Exhibit E, Statement of the Basis of Applicant's Ownership.

15. DOES THE APPLICANT(S) SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED? *(See Section 83(a) of the Plant Variety Protection Act.)* [X] Yes *(If "Yes," answer items 16 and 17 below)* [ ] No

16. DOES THE APPLICANT(S) SPECIFY THAT THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? [X] Yes [ ] No

17. IF "YES" TO ITEM 16, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED? [X] Foundation [ ] Registered [X] Certified

18. DID THE APPLICANT(S) PREVIOUSLY FILE FOR PROTECTION OF THE VARIETY IN THE U.S.? [ ] Yes *(If "Yes," give date)* [X] No

19. HAS THE VARIETY BEEN RELEASED, OFFERED FOR SALE, OR MARKETED IN THE U.S. OR OTHER COUNTRIES? [X] Yes *(If "Yes," give names of countries and dates)* [ ] No

The variety was released to certified seed growers in Wisconsin on February 22, 1988. It will be grown on farms for the first year in 1989.

20. The applicant(s) declare(s) that a viable sample of basic seeds of this variety will be furnished with the application and will be replenished upon request in accordance with such regulations as may be applicable.

The undersigned applicant(s) is (are) the owner(s) of this sexually reproduced novel plant variety, and believe(s) that the variety is distinct, uniform, and stable as required in Section 41, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.

Applicant(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.

SIGNATURE OF APPLICANT: Marshall A. Brinkman — DATE: 5/17/89

SIGNATURE OF APPLICANT — DATE

FORM LS-470 (3-86) *Edition of 7-84 obsolete.*

Exhibit A

Origin and Breeding History of the Variety

Chopper Barley (Wisconsin selection X2860-3, PI525193)

Chopper barley was developed by small grain workers at the Wisconsin Agricultural Experiment Station. The pedigree of Chopper is Butte/SD71-698. Butte is a two-rowed cultivar that was developed by Montana State University, and SD71-698 is a two-rowed breeding selection that was entered in the 1974 Mississippi Valley Barley Nursery (Uniform nursery) by Dr. Phil Price of South Dakota State University. The parents of SD71-698 are Larker, and six-rowed midwestern malting barley that was widely grown in the 1970's, and Firlbecks III, a western two-rowed malting cultivar that was popular in the 1960's.

The Butte/SD71-698 cross from which Chopper was developed was made in a greenhouse in February, 1976, and F_1 plants were grown at Madison during the summer of 1976. Pedigree breeding was used in the F_2 through F_6 generations, with F_2 plant rows grown in 1977 and head rows evaluated in the F_3 through F_6 generations in 1978 through 1981. Primary selection criteria in the F_2 through F_6 generations were productive agronomic type, straw stiffness, and resistance to diseases (primarily mildew). The F_6 head row which eventually became Chopper was harvested in bulk in 1981 and tested in preliminary yield trials in 1982 and 1983. The 1982 preliminary nursery that contained X2860-3 was a single-replicate test, while the 1983 nursery was a three-replicate test. X2860-3 was entered in the advanced yield trial (RRYT) at Madison in 1984, but data was not collected from the RRYT because severe soil compaction resulted in very uneven stands. X2860-3 was entered in the RRYT yield trial at Madison and four branch station yield trials throughout the state in 1985-87.

X2860-3 continued its impressive performance in 1985, ranking first of 22 entries across all locations in grain yield and test weight. It yielded 93 bu/a with a 54.0 lb/bu test weight at Madison in 1985. The selection continued to perform well in 1986 and 1987 statewide trials. It was also entered in the 1986 Mississippi Valley Barley Nursery. X2860-3 has had good malting ratings in several nurseries, but it was not submitted to the American Malting Barley Association for pilot and plant scale testing and therefore is not considered to be a malting cultivar. X2860-2 was also evaluated in a barley and oat forage test at Arlington, Wisconsin in 1986, 1987 and 1988.

Foundation seed of Chopper barley was produced in 1987 and was released to certified seed growers in Wisconsin in February, 1988. Certified seed was produced in 1988 and will be planted on farms for the first time in 1989. Chopper demonstrated agronomic and kernel uniformity throughout the yield testing and seed increase phases. It is considered to be a pure, stable cultivar.

8900139

REVISED

EXHIBIT B

Novelty Statement

Chopper has several characteristics that distinguish it from most barley cultivars that are currently grown in the Midwest. It is a two-rowed barley, so it differs from all other cultivars except Bowman in spike type (Table 1a). Bowman and Chopper are slightly different in height, with Chopper averaging 0.7 inch taller than Bowman (Table 1b). The two cultivars differ in maturity and reaction to several diseases. Chopper has not matched Bowman in grain yield and test weight, but that was not a major concern in the decision to release Chopper because it is intended to be used as a forage barley that is harvested in the late boot to early heading stage.

Chopper is a rough-awned cultivar that is best adapted to growing conditions that are relatively cool and moist. It has averaged 3.3 days later in heading than Bowman in 15 test sites where heading date was recorded (Table 1b). In the few trials where diseases were present in Wisconsin in the mid-to-late 1980's Chopper has demonstrated excellent resistance to powdery mildew, spot blotch, and leaf rust (Table 1b). In contrast, Bowman is a smooth-awned, early heading cultivar that has moderate resistance to powdery mildew and is susceptible to spot blotch and leaf rust.

As mentioned above, the decision to release Chopper was based more on its forage performance in our barley and oat forage tests than on its record as a grain barley. In the 1980's the proportion of barley and oat acreage that was harvested as forage increased substantially. Many farmers are mixing field peas with their small grains at planting time and are harvesting the small grain-pea mixture when the small grain is in the late boot to early heading stage. This provides an excellent forage for the dairy herd, and at least one cutting from the underseeded alfalfa stand can be harvested later in the establishment year.

Chopper was named to imply use as a forage barley. We are promoting it as a barley that produces high forage yields that have average forage quality.

'Chopper' is most similar to 'Bowman'.
AAA 9 Mar 1993 per phone conv. (by GTT)
with applicant. See letter of Dec. 14, 1992

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Table 1b. Performance of Bowman and Chopper barley at various locations in Wisconsin, 1985-89.

Cultivar	Grain yield	Test wt	Crude protein	Head date	Height	Lodging	Powdery mildew	Spot blotch	Leaf rust
	bu/a	lb/bu	%	June	in	%	%	0-9	%
				1985					
Bowman	86.9	53.1		8.2	31.7	5	14		50
Chopper	92.9	54.0		12.5	35.7	12	2		5
No. loc.	1	1		1	1	1	1		1
				1986					
Bowman	64.6	49.0		15.1	28.2	59			
Chopper	62.2	48.6		18.6	29.3	52			
No. loc.	4	4		2	4	1			
				1987					
Bowman	55.7	48.0	15.6	11.1	26.0	24			
Chopper	53.7	48.6	14.6	13.6	26.9	48			
No. loc.	5	5	1	4	4	2			
				1988					
Bowman	45.4	47.5	15.4	10.4	24.4				
Chopper	38.2	46.1	16.4	13.5	23.2				
No. Loc.	6	6	1	4	6				
				1989					
Bowman	66.1	50.0	14.3	19.3	31.4	16	10	6	
Chopper	55.3	46.7	14.7	23.1	33.0	30	2	0	
No. loc.	4	4	4	4	4	3	1	1	
				1985-89					
Bowman	55.3	48.7	14.7	13.4	27.3	23	12	6	50
Chopper	50.5	47.4	15.0	16.7	28.0	34	2	0	5
No. loc.	20	20	6	15	19	7	2	1	1

Locations included Arlington, Ashland, Chilton, Lancaster, Madison, Marshfield, and Racine.

89/00139

Table 1a. Description of current barley cultivars in the Midwest.

Cultivar	Origin	Year of Release	Spike Type	Awn Type	Quality	Maturity	Reaction to diseases: Leaf Rust	Loose Smut	Powdery Mildew
Azure	N. Dakota	1982	6	smooth	malt	mid	S	S	S
Bounty	Canada	1988	6	smooth	feed	mid	MS	S	R
Bowers	Michigan	1979	6	smooth	feed	late	MS	S	R
Bowman	N. Dakota	1984	2	smooth	feed	early	S	S	MR
Chopper	Wisconsin	1988	2	rough	forage	late	R	S	R
Glenn	N. Dakota	1978	6	rough	malt	early	S	S	S
Hazen	N. Dakota	1984	6	smooth	feed	mid	S	S	I
Morex	Minnesota	1978	6	smooth	malt	early	S	S	S
Robust	Minnesota	1983	6	smooth	malt	mid	S	S	S

R = resistant, MR = moderately resistant, I = intermediate, MS = moderately susceptible, and S = susceptible.

chopper barley

FORM APPROVED: OMB NO. 40-R3822

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
LIVESTOCK, POULTRY, GRAIN & SEED DIVISION
BELTSVILLE, MARYLAND 20705

EXHIBIT C
(Barley)

OBJECTIVE DESCRIPTION OF VARIETY

BARLEY *(HORDEUM VULGARE)*

INSTRUCTIONS: *See Reverse.*

NAME OF APPLICANT(S)
Wisconsin Agriculture Experiment Station (M.A. Brinkman authorized)

ADDRESS *(Street and No. or R.F.D. No., City, State, and ZIP Code)*
Agriculture Hall
University of Wisconsin-Madison
Madison, WI 53706

FOR OFFICIAL USE ONLY
PVPO NUMBER 8900139

VARIETY NAME OR TEMPORARY DESIGNATION
Chopper

Place the appropriate number that describes the varietal character of this variety in the boxes below.
Place a zero in first box (i.e. [0][8][9] or [0][9]) when number is either 99 or less or 9 or less.

1. GROWTH HABIT:

[1] 1 = SPRING 2 = FACULTATIVE WINTER 3 = WINTER [3] Early Growth: 1 = PROSTRATE 2 = SEMIPROSTRATE 3 = ERECT

2. MATURITY (50% Flowering):

[3] 1 = EARLY (California Mariout) 2 = MIDSEASON (Betzes) 3 = LATE (Frontier) 4 days later than Morex 2 days later than Robust

[2] No. of days *Earlier* than ..... [8]
[3] No. of days *Later* than ..... [4]
1 = BETZES 2 = CALIFORNIA MARIOUT 3 = CONQUEST 4 = DICKSON 5 = PIROLINE 6 = PRIMUS 7 = UNITAN 8 = Butte

3, PLANT HEIGHT (From soil level to top of head):

[3] 1 = SEMIDWARF 2 = SHORT (California Mariout) 3 = MEDIUM TALL (Betzes) 4 = TALL (Conquest)

[0][5] Cm. *Shorter* than ..... [4]
[0][2] Cm. *Taller* than ..... [8]
1 = BETZES 2 = CALIFORNIA MARIOUT 3 = CONQUEST 4 = DICKSON 5 = PIROLINE 6 = PRIMUS 7 = UNITAN 8 = Bowman

4. STEM:

[1] Exertion *(Flag to spike at maturity):* 1 = 0 - 3 cm. 2 = 3 - 10 cm. 3 = 10 - 15 cm. [1] Anthocyanin: 1 = ABSENT 2 = PRESENT

[0][5] NO. OF NODES (Originating from node above ground)

[1] Collar Shape: 1 = CLOSED 2 = V-SHAPED 3 = OPEN 4 = MODIFIED CLOSED OR OPEN [1] Shape of Neck: 1 = STRAIGHT 2 = SNAKY 3 = OTHER (Specify)

5. LEAF:

[1] Basal leaf sheath *(seedling):* 1 = GLABROUS 2 = PUBESCENT [2] Position of flag leaf *(at boot stage):* 1 = DROOPING 2 = UPRIGHT

[3] Waxiness: 1 = ABSENT (Glossy) 2 = SLIGHTLY WAXY 3 = WAXY [1][1] MM. WIDTH (First leaf below flag leaf)

[1][8] CM. LENGTH (First leaf below flag leaf) [1] Anthocyanin in leaf sheath: 1 = ABSENT 2 = PRESENT

6. HEAD:

[1] Type: 1 = TWO-ROWED 2 = SIX-ROWED [1] Density: 1 = LAX 2 = ERECT (Not dense) 3 = ERECT (Dense)

[4] Shape: 1 = TAPERING 2 = STRAP 3 = CLAVATE 4 = OTHER (Specify) Parallel [2] Waxiness: 1 = ABSENT (Glossy) 2 = SLIGHTLY WAXY 3 = WAXY

[1] Lateral Kernels Overlap: 1 = NONE 2 = AT TIP 3 = 1/4 - 1/2 OF HEAD [3] Rachis *(Hair on edge):* 1 = LACKING 2 = FEW 3 = COVERED

7. GLUME:

[3] Length: 1 = 1/3 OF LEMMA 2 = 1/2 OF LEMMA 3 = MORE THAN 1/2 OF LEMMA [3] Hairs: 1 = NONE 2 = SHORT 3 = LONG

[4] Hair covering: 1 = NONE 2 = RESTRICTED TO MIDDLE 3 = CONFINED TO BAND 4 = COMPLETELY COVERED

[3] Awns: 1 = LESS THAN EQUAL TO LENGTH OF GLUMES 2 = EQUAL TO LENGTH OF GLUMES 3 = MORE THAN EQUAL TO LENGTH OF GLUMES

[3] Awn Surface: 1 = SMOOTH 2 = SEMISMOOTH 3 = ROUGH

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8900139

8. LEMMA:

[5] Awn: 1 = AWNLESS 2 = AWNLETS ON CENTRAL ROWS, AWNLESS ON LATERAL ROWS 3 = SHORT ON CENTRAL ROWS, AWNLETS ON LATERAL ROWS 4 = SHORT (less than equal to length of spike) 5 = LONG (longer than spike) 6 = HOODED

3 AAA 27 Apr 1993 per letter

[4] Awn Surface: 0 = AWNLESS 1 = SMOOTH 2 = SEMISMOOTH 3 = ROUGH

[1] Teeth: 1 = ABSENT 2 = FEW 3 = NUMEROUS

[1] Hair: 1 = ABSENT 2 = PRESENT

[1] Shape of base: 1 = DEPRESSION 2 = SLIGHT CREASE 3 = TRANSVERSE CREASE

[2] Rachilla Hairs: 1 = SHORT 2 = LONG

9. STIGMA:

[2] Hairs: 1 = FEW 2 = MANY

10. SEED:

[2] Type: 1 = NAKED 2 = COVERED

[1] Hairs on Ventral Furrow: 1 = ABSENT 2 = PRESENT

[4] Length: 1 = SHORT (8.0 mm.) 2 = SHORT TO MIDLONG (7.5 - 9.0 mm.) 3 = MIDLONG (8.5 - 9.5 mm.) 4 = MIDLONG TO LONG (9.0 - 10.5 mm.) 5 = LONG (10.0 mm.)

[3] Wrinkling of hull: 1 = NAKED 2 = SLIGHTLY WRINKLED 3 = SEMIWRINKLED 4 = WRINKLED

[1] Aleurone Color: 1 = COLORLESS (White or Yellow) 2 = BLUE

[0][2] PERCENT ABORTIVE

[3][7] GMS. PER 1000 SEEDS

11. DISEASE: (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

[0] SEPTORIA	[0] NET BLOTCH	[2] SPOT BLOTCH	[2] POWDERY MILDEW
[1] LOOSE SMUT	[0] BACTERIAL BLIGHT	[2] COVERED SMUT	[0] FALSE LOOSE SMUT
[0] STEM RUST	[2] LEAF RUST	[1] SCAB	[2] SCALD
[0] AY	[0] BSMV	[2] BYDV	[ ] OTHER (Specify)

12. INSECT: (0 = Not tested, 1 = Susceptible, 2 = Resistant)

[0] GREEN BUG	[0] ENGLISH GRAIN APHID	[0] CHINCH BUG	[0] ARMYWORM
[0] GRASS HOPPERS	[0] CERIAL LEAF BETTLE	[ ] OTHER (Specify)	

HESSIAN FLY RACES: [0] GP [0] A [0] B [0] C [0] D [0] E [0] F [0] G

13. CHEMICAL (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

[0] DDT [ ] OTHER (Specify)

14. INDICATE WHICH VARIETY MOST CLOSELY RESEMBLES THAT SUBMITTED:

CHARACTER	NAME OF VARIETY	CHARACTER	NAME OF VARIETY
Plant tillering	Bowman	Seed size	Bowman
Leaf size	Bowman	Coleoptile elongation	
Leaf color	Morex	Seedling pigmentation	
Leaf carriage	Bowman		

REFERENCES: The following publications may be used as a reference aid for the standardization of character descriptions and terms used in this form:

1. Wiebe, G. A., and D. A. Reid, 1961, Classification of Barley Varieties Grown in the United States and Canada in 1958, Technical Bulletin No. 1224, U.S. Dept. of Agriculture.
2. Reid, D. A., and G. A. Wiebe, 1968, Barley: Origin, Botany, Culture, Winter Hardiness, Genetics, Utilization, Pests, Agriculture Handbook No. 338, U.S. Dept. of Agriculture. pp. 61 - 84.
3. Malting Barley Improvement Association, Milwaukee, Wisconsin, 1971, Barley Variety Dictionary.

COLOR: Nickerson's or any recognized color fan may be used to determine color of the described variety.

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Exhibit D

Additional Description of the Variety

Chopper is a 2-rowed, rough-awned, white aleurone spring barley that will be marketed as a dual purpose barley. When harvested at early heading, forage yields of Chopper have averaged 500-1000 lbs/a higher (dry basis) than forage yields of the six-rowed cultivars Hazen, Morex, and Robust (Table 2). Forage quality of the six-rowed barley is somewhat better than forage quality of Chopper, as Chopper is somewhat lower in protein percentage and somewhat higher in fiber (ADF and NDF). Growers who want both high forage yield and high forage quality will plant field peas with Chopper.

The performance of Chopper when grown to ripening and harvested as grain is summarized in Tables 3, 4, and 5. When grown to maturity Chopper has the potential to produce high yields of grain and straw, and it is consistently high in test weight. Its main drawback as a grain barley is that it is susceptible to lodging during the three week period immediately following heading. Thereafter it stiffens quite well and seems more lodging resistant than the six-rowed barleys at maturity. It is best adapted to soils that range from medium low to medium high in fertility. It has performed very well in these types of soils with little or no applied fertilizer, provided that moisture is adequate.

Table 2. Forage characteristics of barley and oat varieties at Arlington, Wisconsin, 1986-87.

Barley or oat variety	Cut date	Forage yield[1/]	Forage protein	Prot prod	ADF	NDF	Alfalfa yield in Aug. of estab. year[2/]	Total first year forage yield[3/]	1st cut alfalfa yield in year after estab.
	June	lb/a	%	lb/a	%	%	lb/a	lb/a	lb/a
					Barley				
Morex	6.5	3332	16.4	546	32.4	57.6	2234	5566	5730
Hazen	7.3	3819	15.3	584	34.0	59.2	2192	6011	5772
Robust	8.0	3460	16.4	567	33.5	58.6	2191	5651	5825
Chopper	8.3	4372	15.0	656	35.5	61.0	2091	6463	5915
					Oats				
Ogle	9.7	3273	14.7	481	34.2	55.6	2456	5729	6015
Centennial	10.7	3430	14.9	511	31.3	53.2	2338	5768	5925
Hazel	11.0	3760	14.1	530	33.5	56.3	2337	6097	5426
Porter	14.3	4189	14.6	612	33.8	56.8	2194	6383	5345

1/ Barley and oats were harvested at early heading (Feekes' 10.1).
2/ Fall regrowth of alfalfa, although it was approximately 18 to 20 inches in height, was not harvested in October in either year.
3/ Total forage yield = barley or oat forage yield in June plus alfalfa yield in August during the year of alfalfa establishment.

Table 3. Performance of seven barley cultivars grown in Wisconsin yield trials, 1985-87.

Cultivar	Grain yield bu/a	Test wt lb	Head date June	Height in	Lodging %	Grain protein %
Bounty	60.8	44.1	14.4	31.4	30	10.0
Bowers	57.1	44.9	15.6	30.3	32	11.1
Chopper (2R)	59.4	48.4	16.5	29.4	26	10.7
Glenn	53.5	44.4	12.4	30.2	21	12.0
Hazen	59.2	45.4	14.3	30.5	24	11.7
Morex	56.3	45.1	12.7	31.8	34	10.2
Robust	57.2	46.7	14.7	31.0	25	10.2
Average	57.6	45.6	14.4	30.7	27	10.8
No. tests	18	17	11	16	7	2

Table 4. Performance of 10 barley culivars in the Rod Row Yield Trial at Madison, Wisconsin in 1985.

Cultivar	Grain yield bu/a	Test wt lb	Head date June	Height in	Snap back 0-10	Late lodging %	Powdery mildew %	Leaf rust %
Azure	84.3	48.0	9.7	36.5	6.9	18	55	70
Bounty	81.9	49.1	10.0	38.5	6.8	25	10	40
Bowers	71.1	48.7	12.0	35.5	6.9	57	5	40
Bowman	86.9	53.1	8.2	31.7	7.1	5	15	50
Chopper	92.9	54.0	12.5	35.7	6.9	12	2	5
Glenn	70.8	49.8	8.5	34.5	7.0	19	70	60
Hazen	80.2	49.9	9.7	37.7	7.1	4	45	60
Larker	70.4	47.7	9.0	35.5	6.3	62	50	40
Morex	83.8	49.3	8.0	35.7	6.9	15	80	60
Robust	63.9	50.2	9.2	38.0	7.1	35	30	70

Table 5. Performance of six barley checks and X2860-3 (Chopper) in a three-replicate preliminary trial at Madison, Wisconsin in 1983.

Variety	Grain yield bu/a	Test wt lb/bu	Head date June	Height in	Late lodging 0-100
Beacon	44.3	45.0	21.0	34.9	72
Bowers	54.8	45.6	23.0	31.1	54
Butte (2R)	51.2	49.2	27.7	29.4	57
Chopper (2R)	61.2	50.8	25.0	28.7	13
Manker	38.7	47.2	21.0	35.1	80
Morex	41.7	45.8	21.0	34.0	65
Robust	45.9	48.2	22.3	31.5	43

8900139

Exhibit E

Basis of Applicant's Ownership

This is to certify that I have been appointed as the agent of the applicant. The applicant, The Wisconsin Agricultural Experiment Station, is the sole owner of Chopper barley.

Marshall A. Brinkman

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